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1  /*
2  EMA.h - EMA filter implementation for TinyTrackGPS, a simple track GPS to SD card
    logger.
3  TinyTrackGPS v0.14
4
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24 */
25
26 template <uint8_t K, class uint_t = uint16_t>
27 class EMA {
28 public:
29     /// Update the filter with the given input and return the filtered output.
30     uint_t operator()(uint_t input) {
31         state += input;
32         uint_t output = (state + half) >> K;
33         state -= output;
34         return output;
35     }
36
37     static_assert(
38         uint_t(0) < uint_t(-1), // Check that `uint_t` is an unsigned type
39         "The `uint_t` type should be an unsigned integer, otherwise, "
40         "the division using bit shifts is invalid.");
41
42     /// Fixed point representation of one half, used for rounding.
43     constexpr static uint_t half = 1 << (K - 1);
44
45 private:
46     uint_t state = 0;
47 };
48

```